

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
GCE Advanced Subsidiary Level and GCE Advanced Level

**MARK SCHEME for the May/June 2012 question paper**  
**for the guidance of teachers**

**9696 GEOGRAPHY**

**9696/12**

Paper 1 (Core Geography), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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### Section A

#### Hydrology and fluvial geomorphology

1 Fig. 1 shows a waterfall.

(a) Identify the features shown as:

(i) A; [1]

Resistant rock

(ii) B; [1]

Less resistant rock

(iii) C. [1]

Plunge pool

(b) Name the process occurring at D. [1]

Cavitation

(c) Explain how rivers deepen and widen their channels. [6]

The erosional processes are those of hydraulic action, abrasion, and cavitation. Hydraulic action is the force of the water, due to its velocity which allows joints and cracks in the river bed and banks to be exploited. Abrasion is caused by the load carried by the river being ground against bed and banks. Pebbles can become trapped in the bed of the stream and are whirled around by the current to produce pot holing. Cavitation is more infrequent and largely limited to water fall plunge pools, where the implosion of trapped air bubbles produces a deepening of the plunge pool and possible headward erosion.

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## Atmosphere and weather

2 Fig. 2 shows lapse rates representing the atmospheric condition of conditional instability.

(a) (i) Name the lapse rate marked A. [1]

Environmental lapse rate

(ii) Name the lapse rate marked B. [1]

Dry adiabatic lapse rate

(iii) Name the lapse rate marked C. [1]

Saturated adiabatic lapse rate

(iv) Name the line marked D. [1]

Dew point or condensation level.

(b) Explain how conditional instability occurs and describe the type of weather that may result. [6]

In this case of conditional instability, the ground temperature is 30 °C but the air is initially stable as the ELR cools more slowly than the DALR of the parcel of air. However the air parcel is forced to rise by such things as passage over a mountain chain giving rise to cooling at the DALR to such point as it reaches a level where its temperature is the same as that of the ELR. At this point condensation occurs allowing the air parcel to rise at the SALR which is now warmer than the ELR, due to the latent heat of vaporisation so that the air continues to rise. Once condensation has occurred, cloud formation will occur and this could form cumulo-nimbus cloud extending from the height of 1000 m to 3000 m. This could produce rainfall and even thunderstorms.

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## Rocks and weathering

3 Fig. 3 shows a destructive (convergent) plate boundary.

(a) Identify:

(i) the type of tectonic plate marked A; [1]

Oceanic plate

(ii) the landform marked B; [1]

Island arc volcanoes

(iii) the feature marked C; [1]

Ocean trench

(iv) the zone marked D. [1]

Benioff zone or subduction zone.

(b) Explain the processes occurring at this plate boundary and how the landforms B and C are produced. [6]

Oceanic plates comprise sediments overlying basaltic lavas and are 10–16 km thick.

At a destructive plate margin where convection currents in the magma of the earth's mantle will force the plates together under the ocean surface. The more dense of the two plates is forced to subduct under the thinner or less dense oceanic plate. The subducted plate then melts in the benioff zone and the resultant magma forces its way to the surface forming a series of volcanic island above the surface of the ocean. At the point of impact or subduction a deep ocean trench is formed where the crust is dragged down.

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### Population

4 Fig. 4 shows age/sex pyramids for Japan, an MEDC, in 1950 and 2007 and a predicted age/sex pyramid for 2050.

(a) (i) What percentage of the Japanese population was 65 years and over in 1950? [1]

4.9%

(ii) What is the estimated percentage increase in the population 65 years and over between 2007 and 2050? [1]

18.1%

(b) Using Fig. 4, describe the main differences between the age/sex pyramids for 1950 and 2050. [4]

At least two differences described. Must use figures from the pyramids, max 2 if no data used and must have an element of difference. For example in 1950 35.4% of the population were under 14, whereas in 2050 it is predicted that this figure will decrease to 8.6%, etc. It is expected that all candidates should spot the general difference between the two, i.e. broad base and narrow top in 1950, narrow bottom and wider top in 2050.

(c) Explain the factors that may account for the differences between the 2007 and 2050 age/sex pyramids shown in Fig. 4. [4]

Candidates should be able to explain the lower numbers in under 14 with reference to a lowering birth rate because of continuing social and economic change between 2007 and 2050 (predicted). The narrower middle age groups may be noticed as a knock-on effect from previously lowered birth rates. This may be expanded into explanations of changing role of women, cost of child care, etc. The wider top needs to be explained with reference to better health care, nutrition and general improvements in social care for the elderly, i.e. people are living longer. May attempt explanation of gender differences being more pronounced in the 65 and over age group in 2050.

Mark on quality of explanation and use of data.

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## Migration

5 Fig. 5 shows the main country of origin of immigrants to the UK, an MEDC, in 2003 and 2006.

(a) Using Fig. 5 describe how immigration has changed between 2003 and 2006. [4]

Overall, candidates may identify that the absolute numbers of migrants has increased between the time periods (146.8 thousands vs 389.2 thousand). The pattern has changed to a more European origin, although countries such as India, South Africa and Australia are still prominent and in fact are supplying a greater number of migrants in 2006 than in 2003; e.g. India 25 thousand in 2003 and 46 thousand in 2006. The migration pattern has become dominated by European countries, particularly Poland, Lithuania and Slovakia – all new EU countries taking advantage of EU employment policies (not required to know this). Must have an element of change, should use numbers from the graphs. Look for at least 2 changes, supported by evidence.

Max 3 if no figures.

(b) Give reasons why MEDCs may encourage immigration. [6]

This demands a fairly comprehensive overview of why migrants may be needed. Could include some of the following points, not all are needed, but look for developed ideas for credit.

Generally, 'replacement migration' can fill the gaps left by declining populations in all employment areas

Family ties

The migrants contribute to the economy, through tax etc.

May bring new skills

Labour shortages, particularly the 'dirty and difficult' jobs can be filled by migrants

Lifestyle in MEDCs sustains many service jobs, such as child care, cleaning etc.

Migrants traditionally occupy seasonal jobs, such as in farming, tourism, etc. which suffer from seasonal shortages

Other skilled employment areas may also be filled by migrants, nursing, careworkers, doctors, etc.

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## Settlement Dynamics

### 6 Photograph A shows part of a squatter settlement in Freetown, Sierra Leone, an LEDC.

**(a) Using evidence from Photograph A, describe the characteristics of this squatter settlement.**

Candidates should be able to describe some typical features of squatter settlements from the photograph. Points may include:

Made of scrap material – roof and sides of different material, including some corrugated roofing  
 Densely packed, one storey  
 Open water, which may be sewage  
 No obvious electricity/power  
 Inadequate road surface  
 Rubbish strewn/animals wandering etc.

Any 4 observable points from the photograph. **[4]**

**(b) Explain the advantages and disadvantages of living in settlements such as the one shown in Photograph A.**

The advantages may be low-cost/free use of land, sometimes close to where they need to work, community groups may become established, possible access to services, etc. Disadvantages are well-documented; ideas may include illegal use of land/power pirating (therefore may be evicted at any point), disease, overcrowding, association with criminal activity, sometimes occupying dangerous land, inadequate housing structure in hazardous zones, etc.

At least 2 advantages and 2 disadvantages, with some explanation or development of ideas for the full 6. Credit use of examples. **[6]**

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## Section B

### Hydrology and fluvial geomorphology

- 7 (a) (i) Define the hydrological terms *lag time* and *rising limb*. [4]

Lag time is the time between the peak rainfall and the peak discharge on a hydrograph.

Rising limb is the part of the discharge curve that shows the rise of discharge from the onset of the precipitation until peak discharge is reached.

- (ii) Briefly explain one condition that may produce a rise in the level of baseflow on a storm hydrograph. [3]

Baseflow occurs as a result of infiltration and percolation to groundwater level. It is likely to increase where conditions encourage infiltration and percolation such as steady rainfall where infiltration exceeds intensity (e.g. long periods of drizzle) or where soils/geology are permeable or vegetation encourages infiltration. Any of these circumstances acceptable for the marks.

- (b) With the help of a diagram, explain how the hydrological cycle operates within a drainage basin. [8]

The diagram should show the input of precipitation into the system and its flows upon the surface (overland flow) surface stores, interception by vegetation, and the infiltration and percolation of water to provide throughflow and groundwater stores and flows to the river channel. Channel flow and surface stores of water lead to evaporation and condensation to complete the cycle. Fairly straightforward, so all elements required for full marks. Diagrams can either be flow charts or annotated picture type, but should refer to a drainage basin.

- (c) To what extent can human activities bring about both flooding and low flow in river basins? [10]

Human activities can influence flooding by creating conditions in the catchment area that encourage overland flow and hence increase the rapid response to a rainfall event that could bring about over-bankfull conditions. Such things as deforestation and urbanisation, particularly on flood plains, will encourage overland flow at the expense of the slower baseflow. Similarly, channel straightening or the concreting of channel courses may reduce the channel capacity to deal with sudden inputs of water. Some may cite increased rainfall due to global warming. Low flow may be influenced by extraction (water supply or irrigation) or the damming of the channel in order to control flow. All of these however only influence the degree of flooding or low flow as the prime causes are variations in the input of precipitation. Thus human activities are limited in a causal sense.



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**Level 3**

Good descriptions of human activities for both flooding and low flow with an appreciation of the limited effects of human activities. **(8–10)**

**Level 2**

Some description of human activities in relation to both flooding and low flow although the former will be better developed. Only limited evaluation. **(5–7)**

**Level 1**

Almost entirely flooding with human activities as the main cause. **(0–4)**

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## Atmosphere and weather

- 8 (a) (i) Define the terms *solar radiation* and *terrestrial radiation*. [4]

Solar radiation is incoming short wave radiation from the sun.

Terrestrial radiation is outgoing long wave radiation consequent upon the heating of the earth's surface by solar radiation.

- (ii) Describe how a temperature inversion may occur close to the earth's surface at night. [3]

As there is no incoming solar radiation at night the earth's surface will cool. On clear nights the heat will not be trapped beneath cloud cover thus producing colder air close to the surface with slightly warmer air immediately above. Snow cover is another possibility.

- (b) With the help of diagrams, explain how, on the earth's surface, heat is transferred from areas of radiation excess to areas of radiation deficit. [8]

Heat is transferred from areas of excess (equatorial) to areas of deficit (polar) by two methods. The first is winds or atmospheric circulation and the second is ocean currents. The former could be illustrated by surface winds and pressure belts but, more likely, by the tri-cellular model. The latter can be shown by warm ocean currents flowing polewards from the equator and returning cold current flowing towards the equator often in a figure of eight formation. Most marks can be obtained by well annotated diagrams.

- (c) Explain to what extent an urban climate is different from the climate found in surrounding rural areas. [10]

The built up nature of an urban area does produce variations on the climate as compared to the vegetated and more open rural areas. The most significant driving mechanism is provided by the urban heat island effect. Buildings and dark surfaces absorb more short wave radiation during the day and store it longer at night giving rise to a warmer CBD than the surrounding rural areas that absorb less and radiate long wave radiation more quickly at night. The increased heat (anthropogenic) and pollution in urban areas gives rise to more convection and hygroscopic nuclei providing more rainfall. Pollution can cause smogs (although less mist) and high rise buildings can channel winds but increase friction lowering overall wind speeds. Good answer will realise that these are variations of overall climatic conditions that apply to both rural and urban areas and will be able to indicate the level of variation in terms of percentages or examples.

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**Level 3**

Some balance between rural and urban with an appreciation of the degree of variation.

**(8–10)**

**Level 2**

Main concentration upon urban climates with little reference to rural areas. Only very limited assessment of the extent of the differences.

**(5–7)**

**Level 1**

Little/no explanation of differences beyond hot/cool, windy/calm, etc. Most differences will be ascribed to levels of pollution.

**(0–4)**

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## Rocks and weathering

### 9 (a) (i) Define the weathering terms *hydration* and *oxidation*. [4]

Hydration is a weathering process by which water is added to a mineral causing it to expand and initiate stress within the rock.

Oxidation is a chemical process in which oxygen dissolved in water reacts with minerals (notably iron) to produce oxides (rusting) which leads to the crumbling of the rock.

### (ii) Briefly describe how humic acids can affect the weathering of rocks. [3]

Humic acids are derived from partially decayed organic material in the soil. As an acid they can contribute to chemical weathering by attacking rock minerals (e.g. as part of hydrolysis) and weathering at depth.

### (b) With the help of a diagram, explain how landslides can occur and describe their effects upon slopes. [8]

Diagrams should show a slide plane at the junction of a geological unconformity where shear stress has overcome shear strength, due to gravity (slope angle) or the addition of moisture or most commonly a seismic event. The slide will retain internal consistency, although there may well be some element of rotational slumping. The slope produced will be at a lower angle (hence more stable) although a steep scar may be left at the top end of the slope. Rotation may occur and there is usually an extensively developed low angle foot at the slope base.

### (c) To what extent do different types of weathering occur under different climatic conditions? [10]

Most will realise that climate has an important role to play in weathering. Thus freeze thaw requires frequent temperature changes around freezing point, whilst thermal fracture requires large diurnal ranges of temperature. Chemical weathering requires moisture and is most effective when temperatures are higher (van Toft's law). Dilation is less directly related to climate as it requires the removal of overburden. Good answers will explain that weathering is also dependent upon rock type and structure, thus the same type of weathering (e.g. carbonation or hydrolysis) may occur in different climatic zones on the same rock types but at different rates with resultant differing depths of regolith (Peltier diagram). Mechanical weathering may be seen as more strictly related to climate (i.e. thermal fracture and freeze thaw).

#### Level 3

Good explanation of the relationship between weathering and climate but an appreciation of the role of rock type and structure and hence the qualification of solely climatic influence. (8–10)

#### Level 2

Climatic influences described in terms of processes but only limited appreciation of the impact of rock type and structure. (5–7)

#### Level 1

Description of some processes mainly mechanical (freeze thaw, thermal fracture) with some climatic parameters. (0–4)

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10 (a) (i) Give the meaning of the term *natural increase rate*. [2]

Natural increase rate is the rate at which population grows naturally, i.e birth rate – death rate, excluding migration (1), per thousand per year (1)

(ii) Suggest why birth rates may vary over time. [5]

- natural disasters/displacement/war
- maternal and childcare policies that may change through time; health care provision for mothers and children
- child benefit/allowances
- employment law, allowing parental leave, etc.
- introduction of more widely available contraception, abortion laws, education of women, population policies
- economic boom/recession – the latter leading to possible withdrawal of benefits, hence drop in birth rate, as well as parental choice.
- government/employer attitude to maternity/paternity issues (cf Japan vs Sweden)

It is expected that the candidates would deal with both rising and falling birth rates (cap at 3 if only rise or fall). There may be reference to MEDCs and/or LEDCs.

(b) With reference to one or more examples, describe and explain the problems caused by a falling birth rate. [8]

The implications of demographic decline, caused by falling birth rates should be described and explained, indicators of quality will be detailed knowledge and well used examples, e.g. low birth rates lead to a shortage of workers in the future, governments may have to backtrack on immigration policies. Fewer workers has significant economic implications, not only with job vacancies, but with fewer paying tax to support the non-working population (i.e. ageing). Countries may become economically stretched, causing even wider problems. Reward detail and sound concepts.

(c) How far do you agree with the view that population growth will be too great for existing resources to sustain? [10]

Candidates should be aware of some of the issues surrounding population-resource relationships and how technology and innovation may have increased some regions ability to sustain their populations.

The candidates are asked to discuss the view, so it is expected that some answers may recognise that the view is out-dated and that technology/innovation will prevail (credit examples of technology and innovation). May even mention Boserup vs Malthus as part of their evaluation.

Indications of quality will be a good understanding of population-resource issues and be prepared to critically evaluate whether the view has any likelihood of becoming true.

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**Level 3**

Provide a well-discussed evaluation of the view, applying contemporary detail to the conceptual issues and population-resource relationships. **(8–10)**

**Level 2**

A sound answer which covers most of the points about innovation, but may lack clear evaluation and perhaps conceptual understanding. **(5–7)**

**Level 1**

Illustrates a very basic understanding of population-resource issues, with limited detail and no understanding of the concepts. **(0–4)**

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## Migration

11 Fig. 6 is a model showing some of the factors influencing migration.

(a) (i) Give three examples of possible obstacles to migration. [3]

Cost, distance, national boundaries/policies, knowledge/perception, culture/language, family pressure, etc. Any three that may hinder/prevent migration.

(ii) Explain two push factors which may cause migration. [4]

Quality explanations that could include:  
 population exceeds capacity of environment to support it – declining resources, therefore decreasing employment opportunities – poverty  
 income uncertain/too low – poverty  
 poor services – social, health, etc. – family issues  
 politically unstable/uncertain/war – concerns about safety, etc.  
 environmental disaster – drought, flood, etc.

2/2 split; should have explanation, not just a simple description.

(b) Describe one type of internal migration and explain its impact on the receiving area(s). [8]

Refugee movement (within a country) – impact may be temporary, but will be highly significant and will create an enormous strain on ability of the receiving area to cope, will most likely be supported by international agencies. Some speculation that it creates tension/degradation/undermines local economies

Rural-urban (most likely LEDC) – well-documented, should focus on the impact of the migration, e.g. receiving area unable to provide housing/health/education etc., but benefits from an influx of labour, probably in informal sector, etc.

Urban-rural (most likely MEDC) – impact of counter-urbanisation, depends on the migrants, retired or families, tendency to raise house prices, could provide impetus to improve local services (if families) or vice versa.

Urban-urban – less likely to be able to get a great deal of detail on this type.

Reward detailed explanations of impact, credit use of examples. It may be a 3/5 split. Only one type to be credited.

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- (c) Over the past 15 years the number of people crossing borders in search of a better life has been rising steadily. At the start of the 21st century, one in 35 people was an international migrant.

Using an example or examples of international migration you have studied, examine the extent to which this trend is a result of voluntary or forced (involuntary) migration.

[1]

Candidates are expected to have studied at least one example of an international migration stream and this question is asking them to consider, amongst other things, the nature, scale and causes of their chosen example. Indications of quality will be the way in which the candidates attempt to analyse their example, and apply elements of the statement to their known example(s).

**Level 3**

A comprehensive and well-exemplified answer, that provides a good evaluation of the statement, showing thorough conceptual understanding of the migration process. (8–10)

**Level 2**

A sound answer, showing good knowledge of the example with some attempt to evaluate the statement. (5–7)

**Level**

An answer limited by the quality and depth of the example with little or no attempt to evaluate the statement. (0–4)



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## Settlement Dynamics

### 12 (a) (i) Identify three characteristics of Central Business Districts (CBDs).

Answers may include:

Intensive land use

Dense structure

Vertical use of space

Small residential population

Specialised functions/ clustering of certain functions e.g. retail, finance

High rent costs, etc.

Avoid crediting weak observations such as 'busy', or 'lots of shops'. Look for good geographical terminology

Any three reasonable points.

[3]

### (ii) Outline the main issues which result from changes in Central Business Districts (CBDs).

Candidates could pick up on a variety of issues, including competition from out of town retailing (not so much of an issue in larger cities), congestion, pollution, lack of space for expansion/development, historic buildings creating planning problems, decay of older centres as CBD may shift, etc. Two good points that are well-developed or at least three less so.

Must have some degree of development/explanation/ for the full 4 marks. Credit the appropriate use of examples (not essential for 4, as not asked for).

[4]

### (b) Give the meaning of the term gentrification. Outline the impact of gentrification on urban areas. [8]

Reserve 2 marks for a reasonable definition of gentrification; a process that occurs in certain inner city areas where old substandard housing is bought and modernised by middle/high income households, usually in a piecemeal way – or something along those lines.

The impact has varied and will depend upon point of view – some have seen it as a process that encourages social polarisation in a city, as it inevitably leads to an increase in house prices and the gentrified 'fashionable areas' are often alongside lower status areas. This may push out (perhaps by choice) other groups as the area becomes more affluent. On a positive note, it is a process that has been seen to improve an area dramatically, not only the built environment, but also knock-on effects on local services (shops, schools, etc.). This is then an impact which may spread beyond the original neighbourhood.

Look for both positive and negative impacts and a clear understanding of how gentrification has worked. Credit use of examples, but not essential.

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- (c) **With reference to an example you have studied, assess the success of attempts to solve the problems of the inner city in MEDCs. [10]**

Candidates should be well-versed in examples of this type. Indicators of a quality response would be a detailed and well chosen example, coupled with a clear evaluation of how the 'problem' has been tackled. Within the answer should also be a clear understanding of what the problems actually are; given that it is a loaded term, that is far more than a product of residential location. Ideas may include deprivation, poor housing quality, social and ethnic divisions, criminality, low achievement, poor environment, etc. Some of these problems are, of course found far from the 'inner city' e.g. the banlieue estates in France.

Responses to the problems are varied – London Docklands will probably be the cited example, and done well should provide a reasonable evaluation. Credit well answers that look at how successful the attempts have been, this should be a good indicator of quality.

**Level 3**

A comprehensive answer that provides a detailed evaluation of the contemporary issues and approaches to the inner city referring to detailed and well-chosen example(s). **(8–10)**

**Level 2**

A sound answer showing a reasonable understanding of the issues in the inner city, using examples and a basic attempt at evaluation. **(5–7)**

**Level 1**

A limited answer, covering only the basic issues and offering little more than a basic description of the inner city. Little/no evaluation or exemplification. **(0–4)**